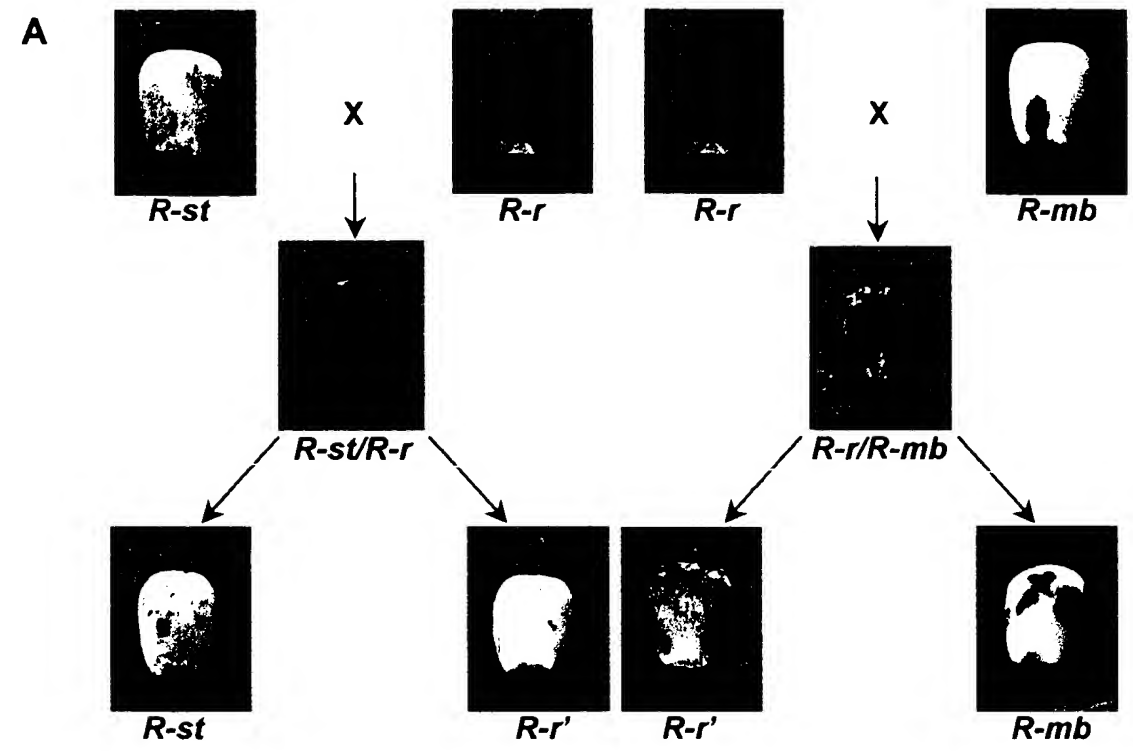

A
X
X
R-st
R-r
R-r
R-mb
R-st/R-r
R-r/R-mb
R-st
R-r'
R-r'
R-mb

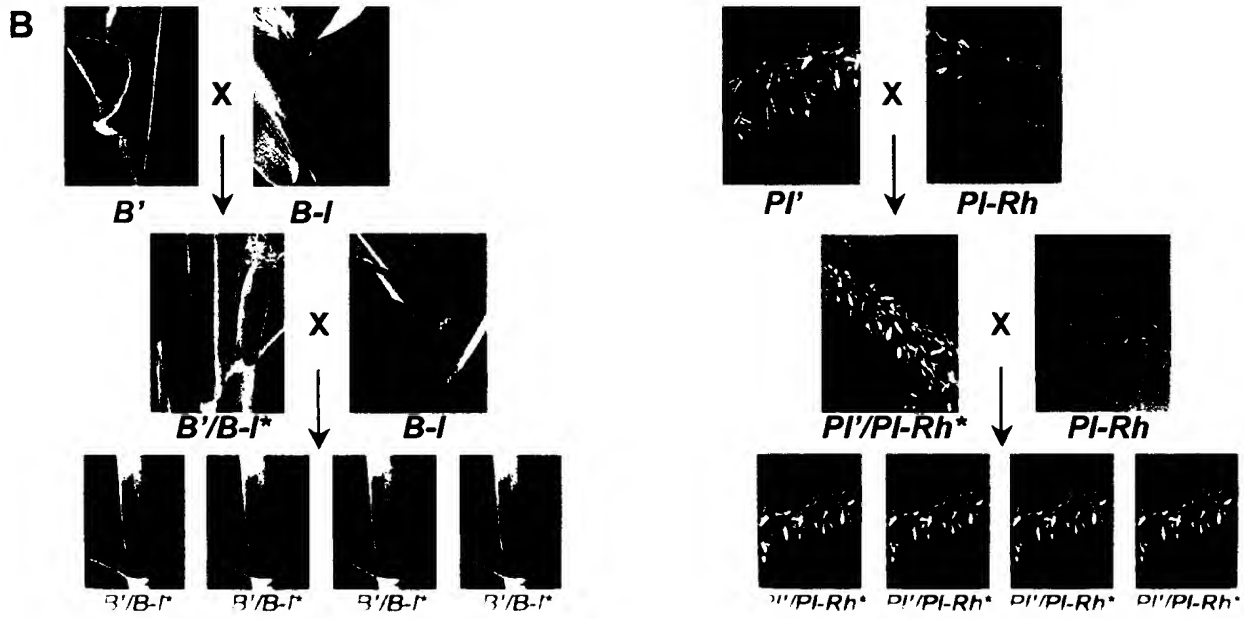
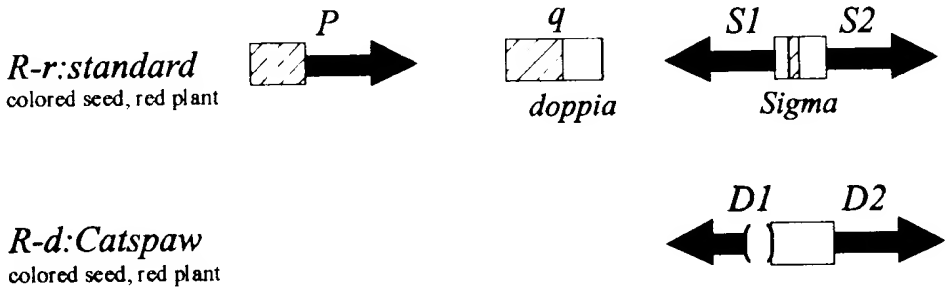

B
X
X
B'
B-l
Pl'
Pl-Rh
X
X
B'/B-l*
B-l
Pl'/Pl-Rh*
Pl-Rh

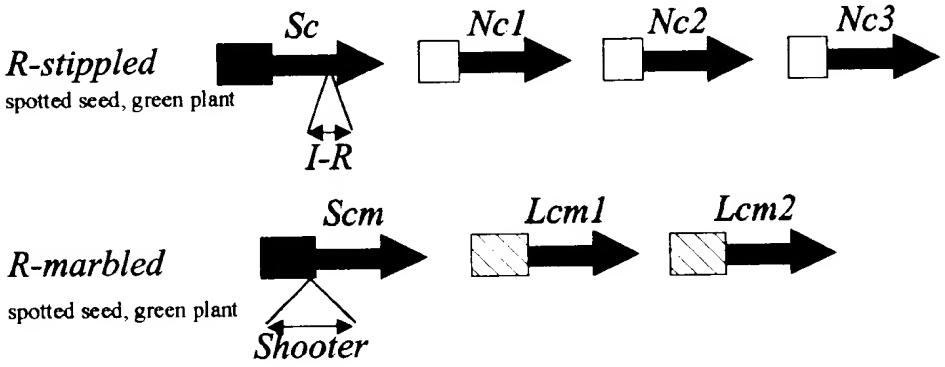
Figure 1

A

Paramutable



Paramutagenic



B

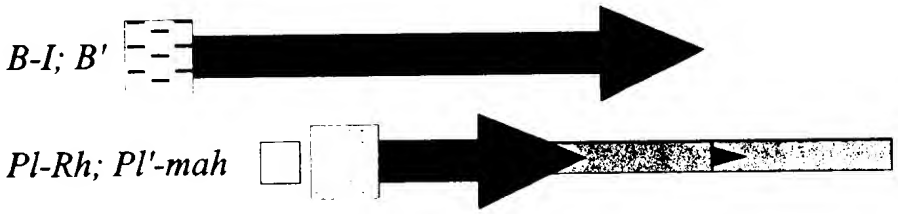


Figure 2

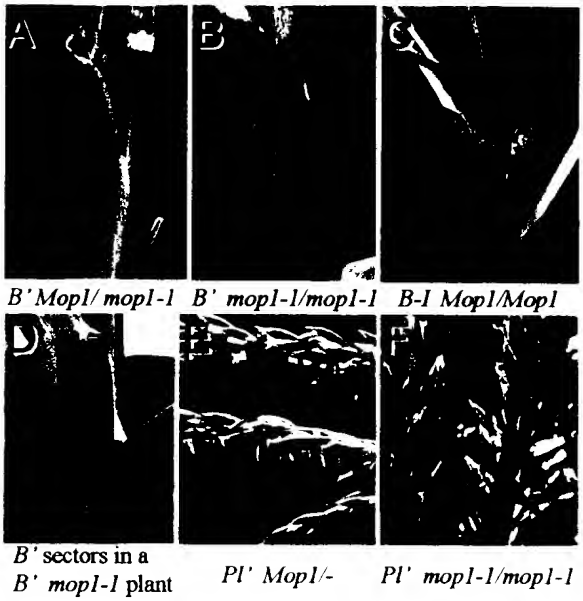

A
B
C
B' Mop1/ mop1-1
B' mop1-1/mop1-1
B-I Mop1/Mop1
D
E
F
B' sectors in a
B' mop1-1 plant
Pl' Mop1/-
Pl' mop1-1/mop1-1

Figure 3

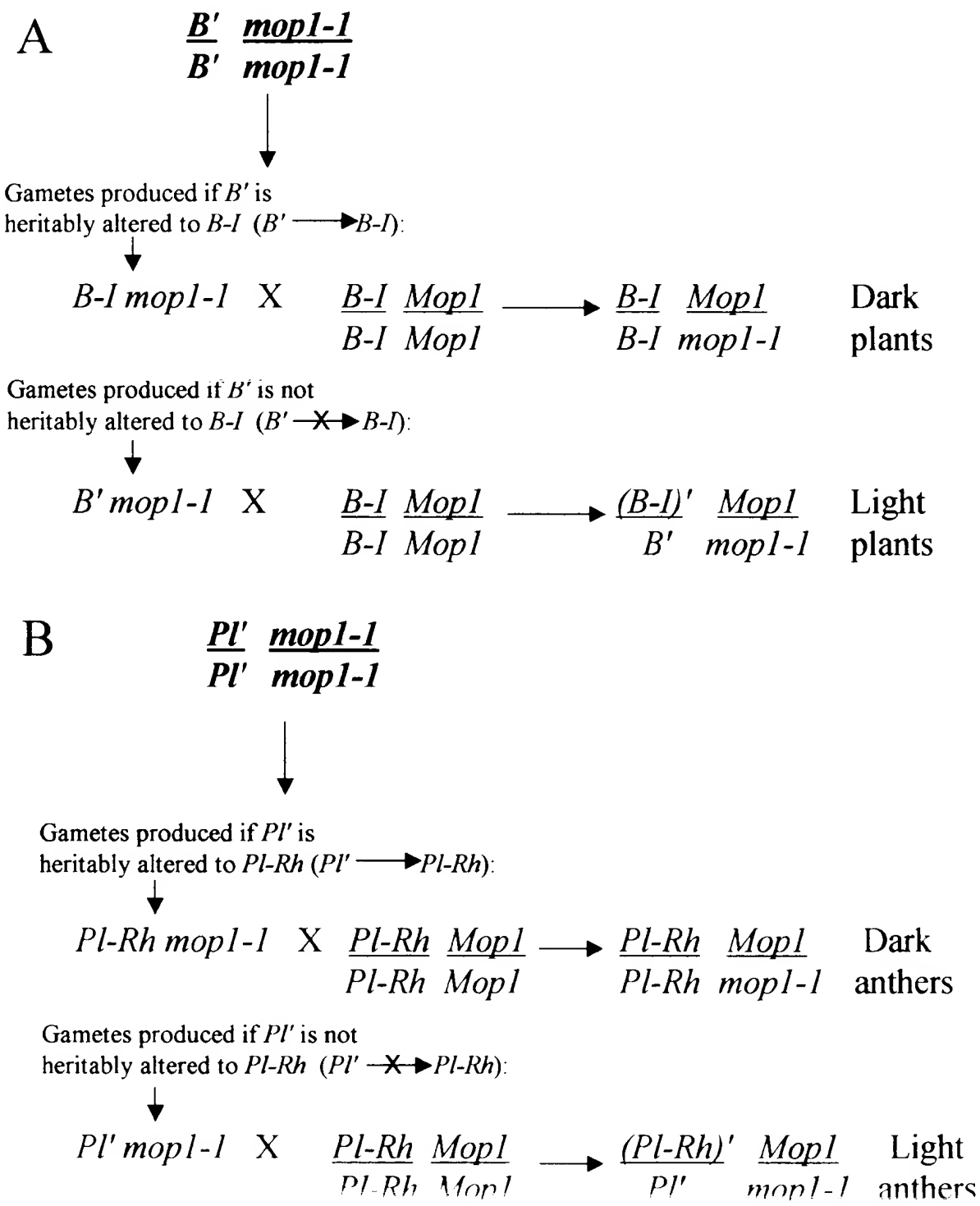

A
B' mop1-1
B' mop1-1
Gametes produced if B' is heritably altered to B-I (B' → B-I):
B-I mop1-1 X B-I Mop1 / B-I Mop1 → B-I Mop1 / B-I mop1-1 Dark plants
Gametes produced if B' is not heritably altered to B-I (B' → X B-I):
B' mop1-1 X B-I Mop1 / B-I Mop1 → (B-I)' Mop1 / B' mop1-1 Light plants
B
Pl' mop1-1
Pl' mop1-1
Gametes produced if Pl' is heritably altered to Pl-Rh (Pl' → Pl-Rh):
Pl-Rh mop1-1 X Pl-Rh Mop1 / Pl-Rh Mop1 → Pl-Rh Mop1 / Pl-Rh mop1-1 Dark anthers
Gametes produced if Pl' is not heritably altered to Pl-Rh (Pl' → X Pl-Rh):
Pl' mop1-1 X Pl-Rh Mop1 / Pl-Rh Mop1 → (Pl-Rh)' Mop1 / Pl' mop1-1 Light anthers

Figure 4

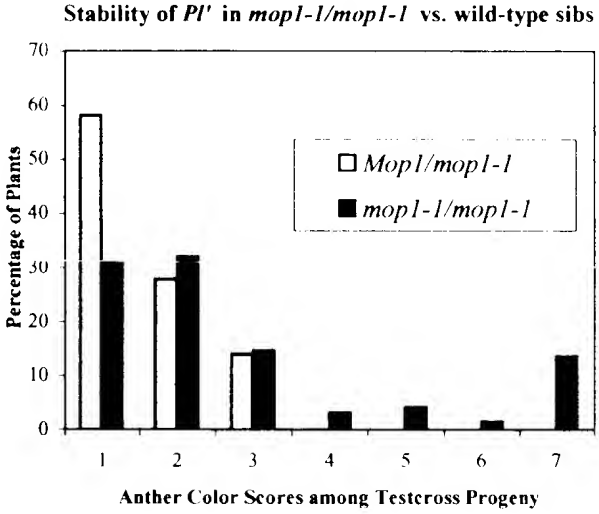

Stability of Pl' in mop1-1/mop1-1 vs. wild-type sibs
Percentage of Plants
70
60
50
40
30
20
10
0
Mop1/mop1-1
mop1-1/mop1-1
1
2
3
4
5
6
7
Anther Color Scores among Testcross Progeny

Figure 5

A

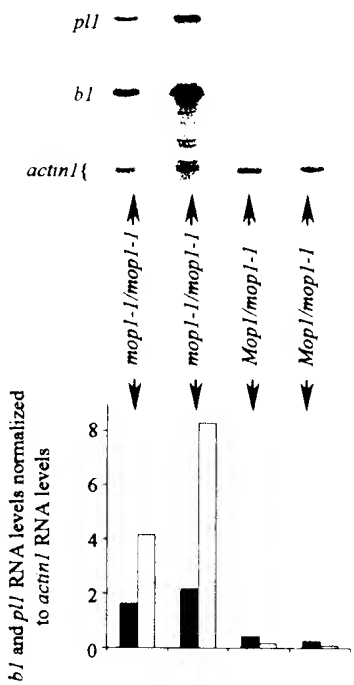
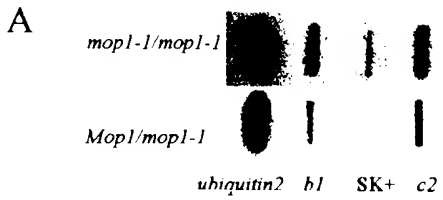
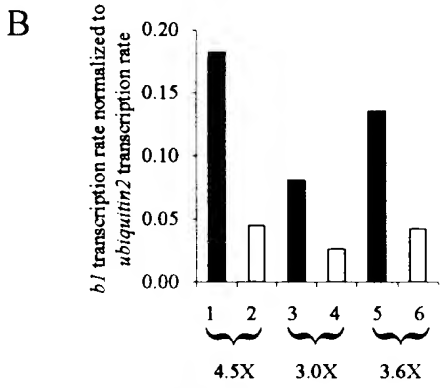
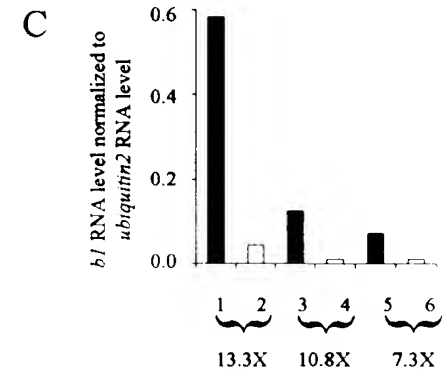
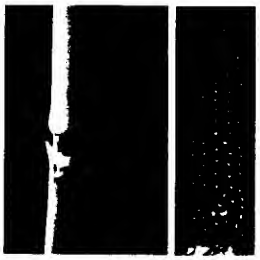

pl1
b1
actin1
mop1-1/mop1-1
mop1-1/mop1-1
Mop1/mop1-1
Mop1/mop1-1
b1 and pl1 RNA levels normalized to actin1 RNA levels
0
2
4
6
8

Figure 6


A
mop1-1/mop1-1
Mop1/mop1-1
ubiquitin2
b1
SK+
c2


B
b1 transcription rate normalized to ubiquitin2 transcription rate
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6
4.5X 3.0X 3.6X


C
b1 RNA level normalized to ubiquitin2 RNA level
0.6
0.4
0.2
0.0
1 2 3 4 5 6
13.3X 10.8X 7.3X

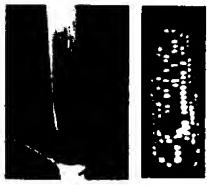
B' mop1-1 **X**  ***B-Peru Mop1***

$$\frac{\textbf{B-Peru}}{\textbf{B'}} \qquad \frac{\textbf{Mop1}}{\textbf{mop1-1}}$$ (Light plants)

⊗ Gives 3/4 purple kernels.

Only purple kernels planted
(*B-Peru/B-Peru* or *B-Peru/B'*)

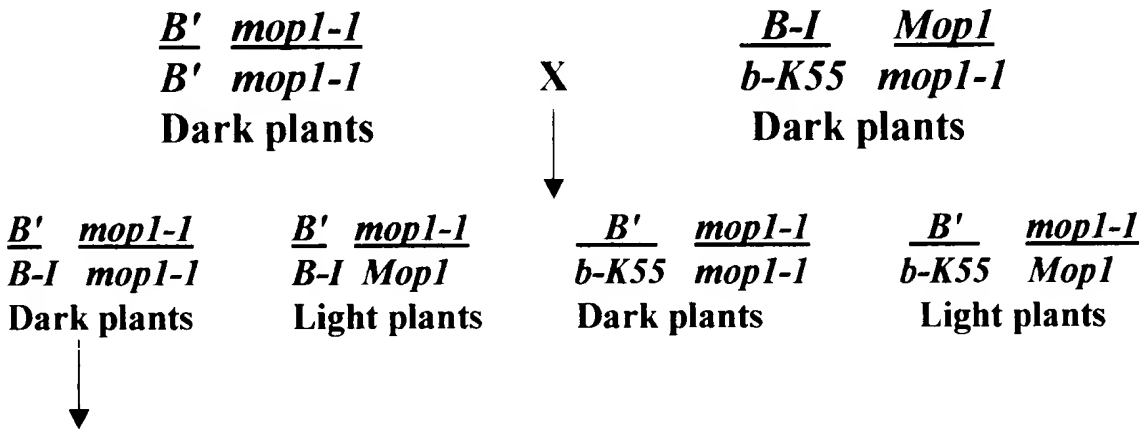
14 $\frac{\textbf{B'}}{\textbf{B-Peru}}$ $\frac{\textbf{mop1-1}}{\textbf{mop1-1}}$



44 $\frac{\textbf{B'}}{\textbf{B-Peru}}$ $\frac{\textbf{Mop1}}{\textbf{-}}$

24 $\frac{\textbf{B-Peru}}{\textbf{B-Peru}}$

20 $\frac{\textbf{Mop1}}{\textbf{-}}$ 4 $\frac{\textbf{mop1-1}}{\textbf{mop1-1}}$



Testcross (by *B-Peru/B-I Mop1/Mop1* tester--diagram shows only *B-Peru* gametes of tester)

Gametes produced if paramutation is prevented (*B-I* —X→ *B'*):

50% B' mop1-1 X *B-Peru Mop1* ⟶ *B' mop1-1 / B-Peru Mop1* Light plants

50% B-I mop1-1 X *B-Peru Mop1* ⟶ *B-I mop1-1 / B-Peru Mop1* Dark plants

Gametes produced if paramutation occurred (*B-I* ⟶ *B'*):

100% B' mop1-1 X *B-Peru Mop1* ⟶ *B' mop1-1 / B-Peru Mop1* Light plants

Figure 9

A

R-st	*B-bar*	*pl-sr*	*Mop1*	X	*R-d*	*B-bar*	*pl-sr*	*Mop1*
r-g	*B'*	*Pl'*	*mop1-1*		*r-g*	*B'*	*Pl'*	*mop1-1*

Four genotypes of interest among *R-d/- Pl'/-* progeny:

3/16	*R-d* / *r-g*	*Mop1* / -	Light plant
3/16	*R-d* / *R-st*	*Mop1* / -	Light plant
1/16	*R-d* / *r-g*	*mop1-1* / *mop1-1*	Dark plant
1/16	*R-d* / *R-st*	*mop1-1* / *mop1-1*	Dark plant

B

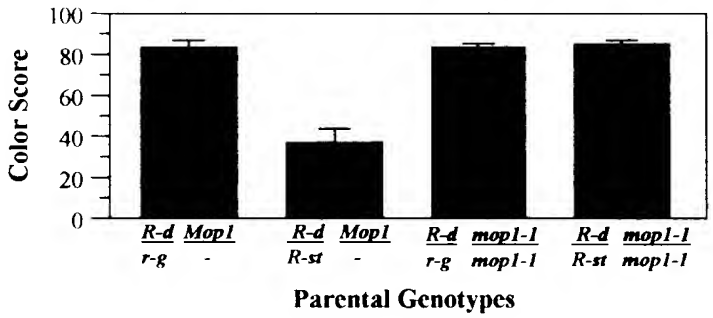


Figure 10

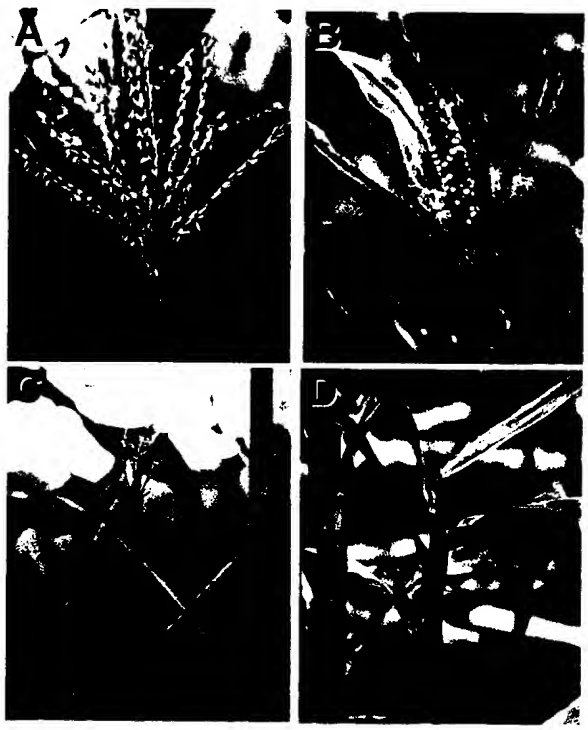


Figure 11

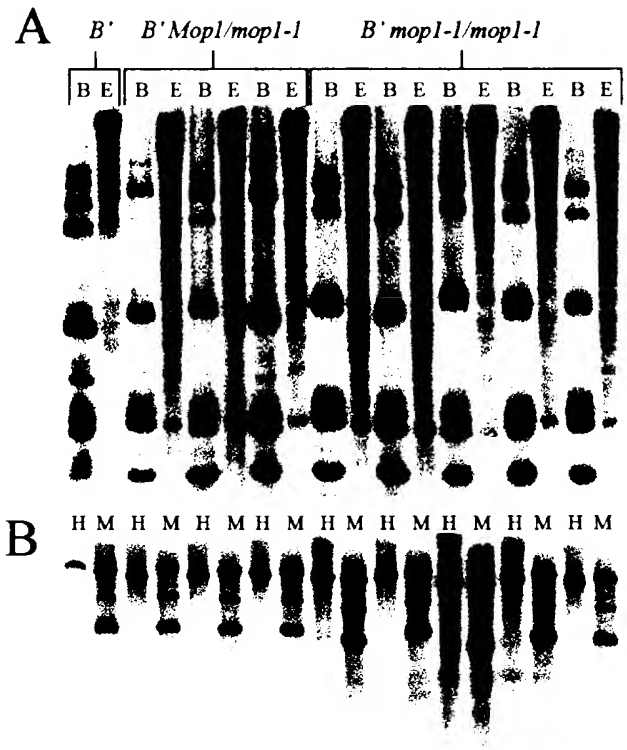

A
B'
B'Mop1/mop1-1
B'mop1-1/mop1-1
B E B E B E B E B E B E B E B E B E B E
B
H M H M H M H M H M H M H M H M H M

Figure 12

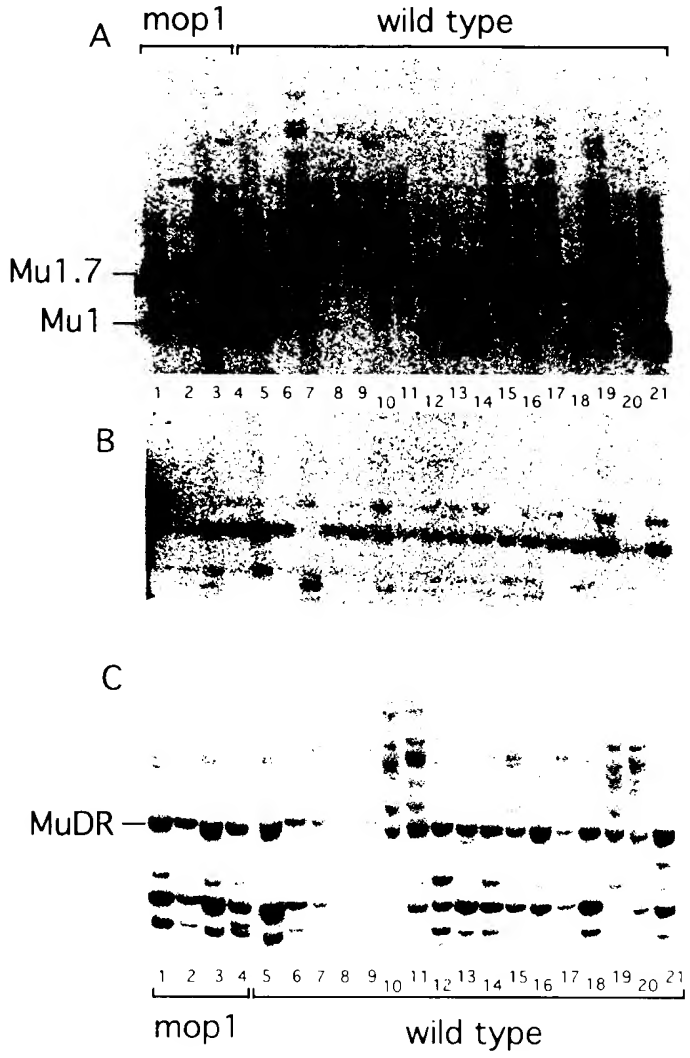

A
mop1
wild type
Mu1.7
Mu1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
B
C
MuDR
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
mop1
wild type

Figure 13

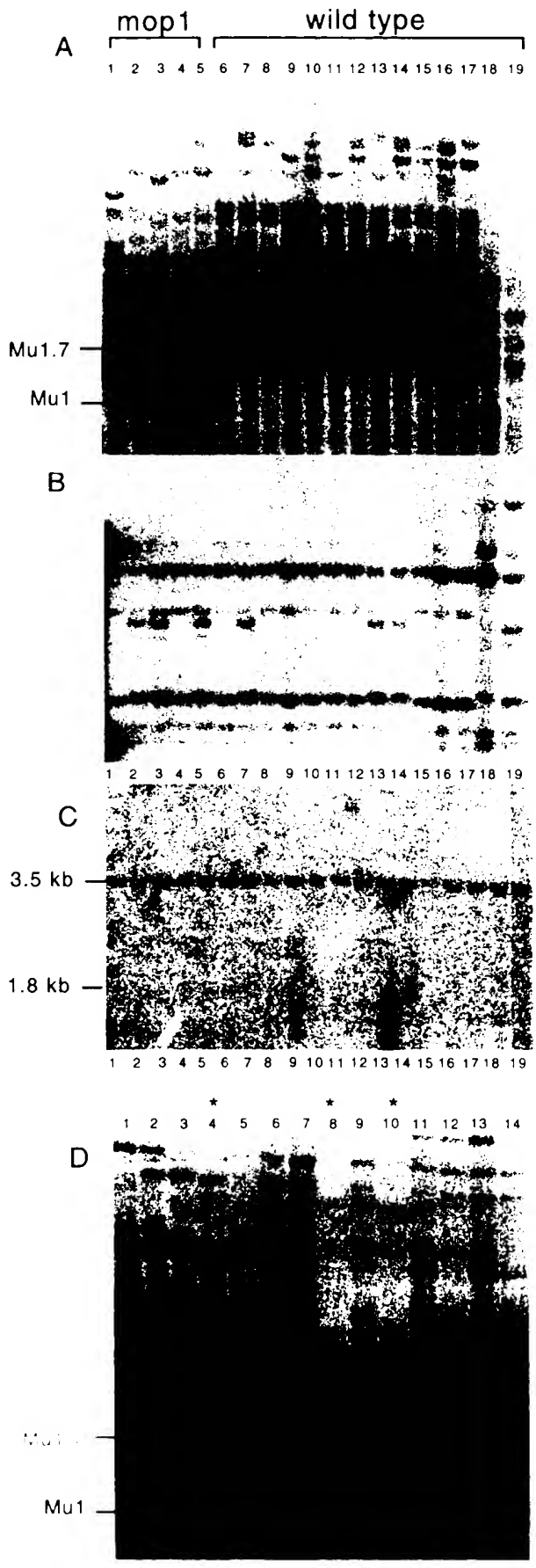

A
mop1
wild type
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Mu1.7
Mu1
B
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
C
3.5 kb
1.8 kb
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
1 2 3 4 5 6 7 8 9 10 11 12 13 14
D
Mu1

Figure 14

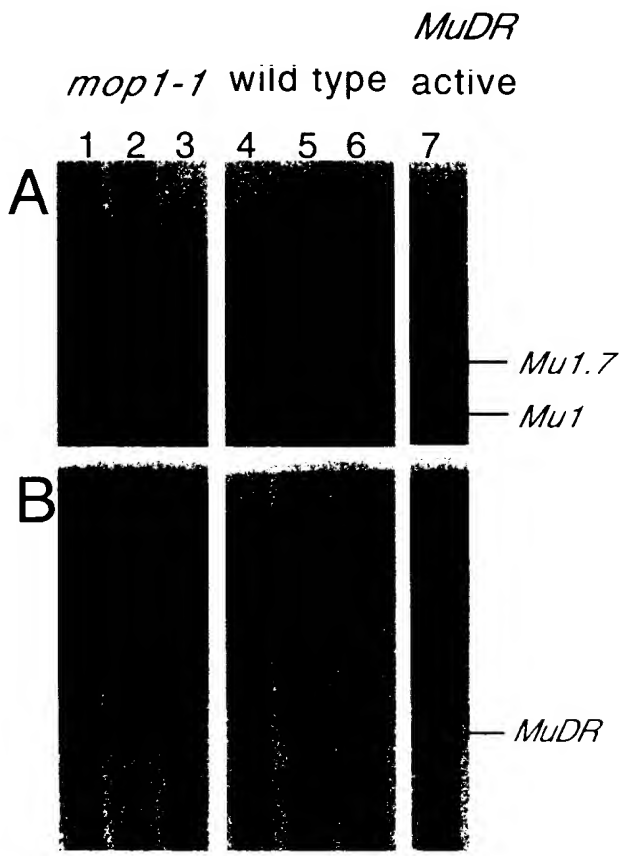


Figure 15

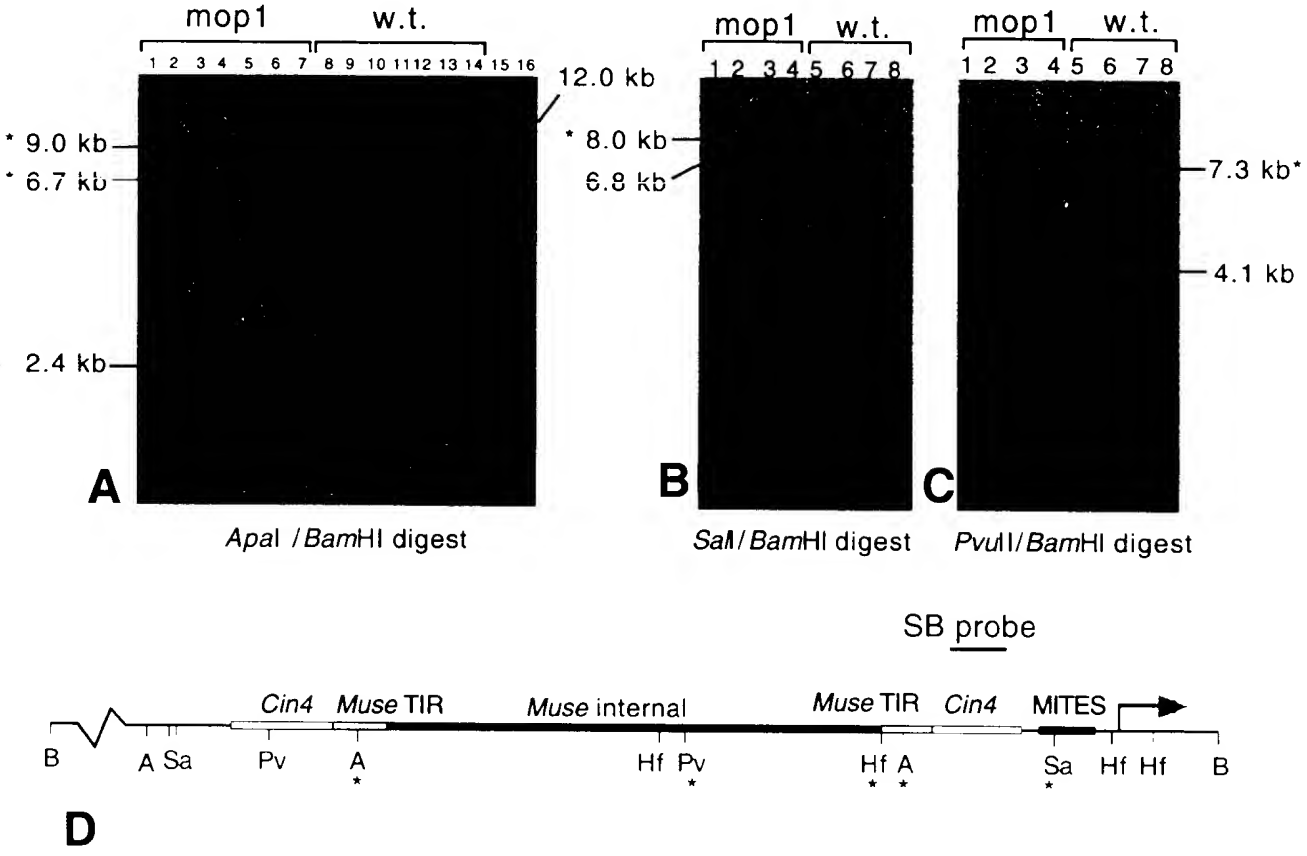

mop1
w.t.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
12.0 kb
* 9.0 kb
* 6.7 kb
2.4 kb
A
ApaI /BamHI digest
mop1
w.t.
1 2 3 4 5 6 7 8
* 8.0 kb
6.8 kb
B
SalI/BamHI digest
mop1
w.t.
1 2 3 4 5 6 7 8
7.3 kb*
4.1 kb
C
PvuII/BamHI digest
SB probe
Cin4
Muse TIR
Muse internal
Muse TIR
Cin4
MITES
B
A Sa
Pv
A
Hf Pv
Hf A
Sa
Hf Hf
B
D

Figure 16

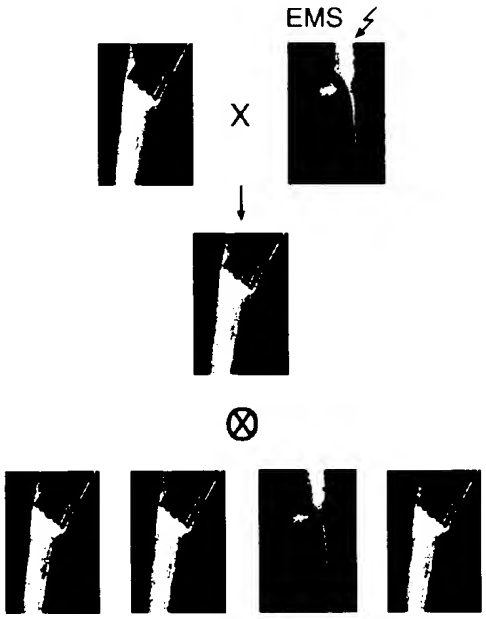


Figure 17

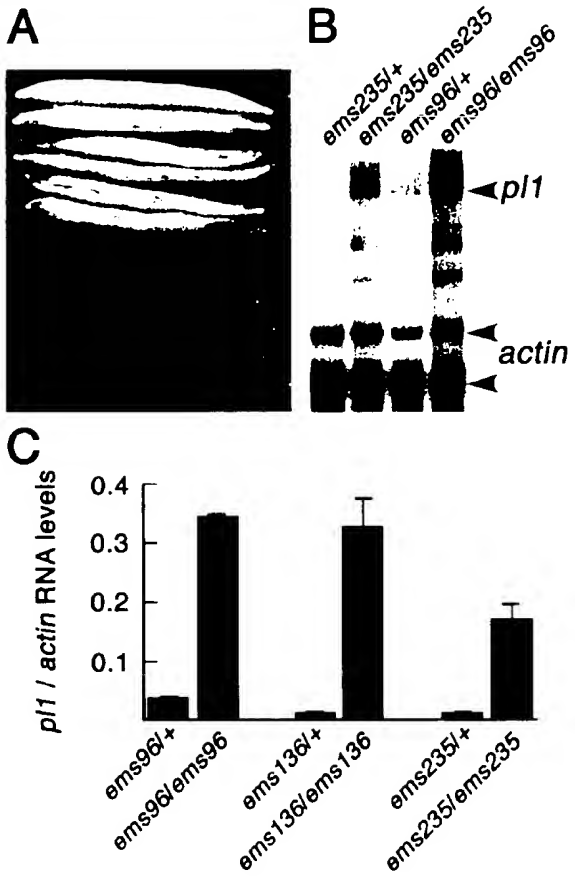

A
B
ems235/+
ems235/ems235
ems96/+
ems96/ems96
pl1
actin
C
pl1 / actin RNA levels
0.4
0.3
0.2
0.1
ems96/+
ems96/ems96
ems136/+
ems136/ems136
ems235/+
ems235/ems235

Figure 18

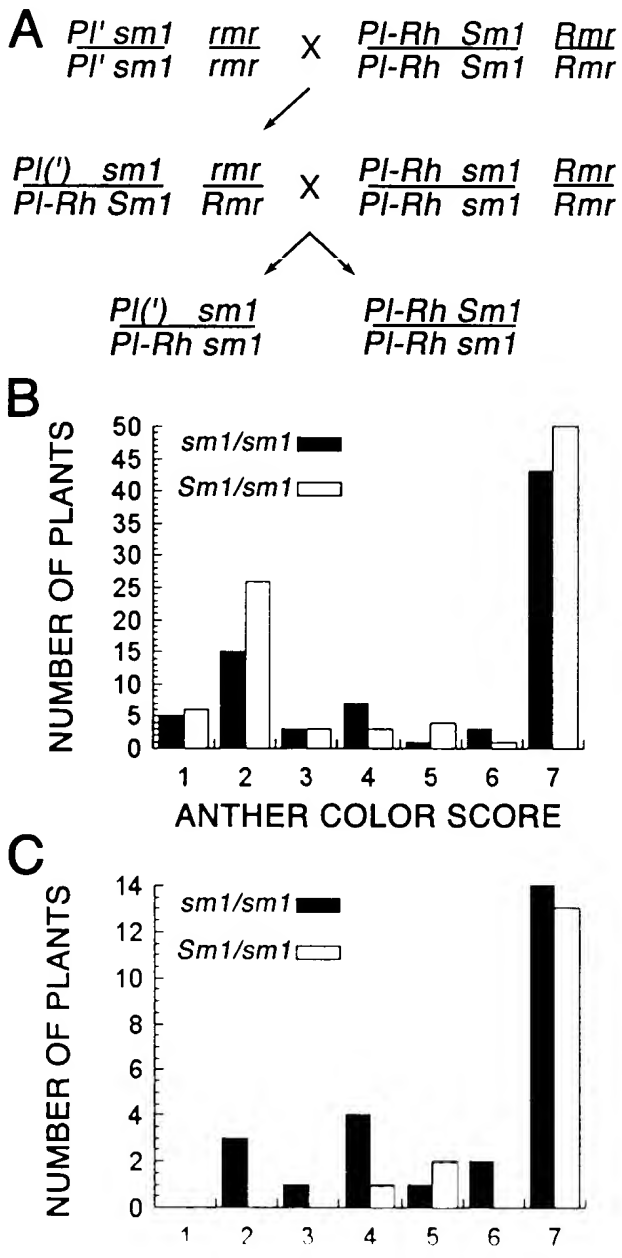

A
Pl' sm1 / Pl' sm1
rmr / rmr
X
Pl-Rh Sm1 / Pl-Rh Sm1
Rmr / Rmr
Pl(') sm1 / Pl-Rh Sm1
rmr / Rmr
X
Pl-Rh sm1 / Pl-Rh sm1
Rmr / Rmr
Pl(') sm1 / Pl-Rh sm1
Pl-Rh Sm1 / Pl-Rh sm1
B
NUMBER OF PLANTS
sm1/sm1
Sm1/sm1
ANTHER COLOR SCORE
C
NUMBER OF PLANTS
sm1/sm1
Sm1/sm1

Figure 19

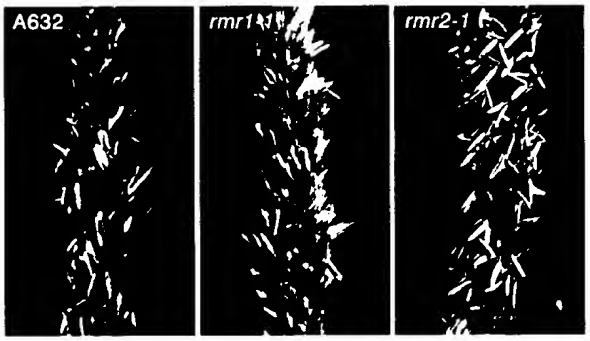


Figure 20

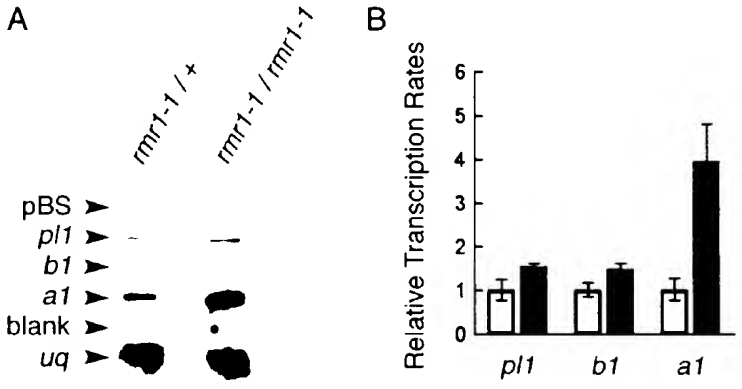

A
rmr1-1 / +
rmr1-1 / rmr1-1
pBS
pl1
b1
a1
blank
uq
B
Relative Transcription Rates
0
1
2
3
4
5
6
pl1
b1
a1

Figure 21

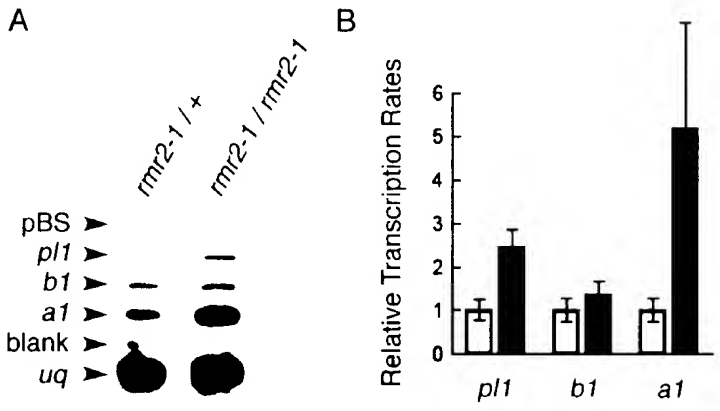

A
rmr2-1 / +
rmr2-1 / rmr2-1
pBS
pl1
b1
a1
blank
uq
B
Relative Transcription Rates
0
1
2
3
4
5
6
pl1
b1
a1

Figure 22

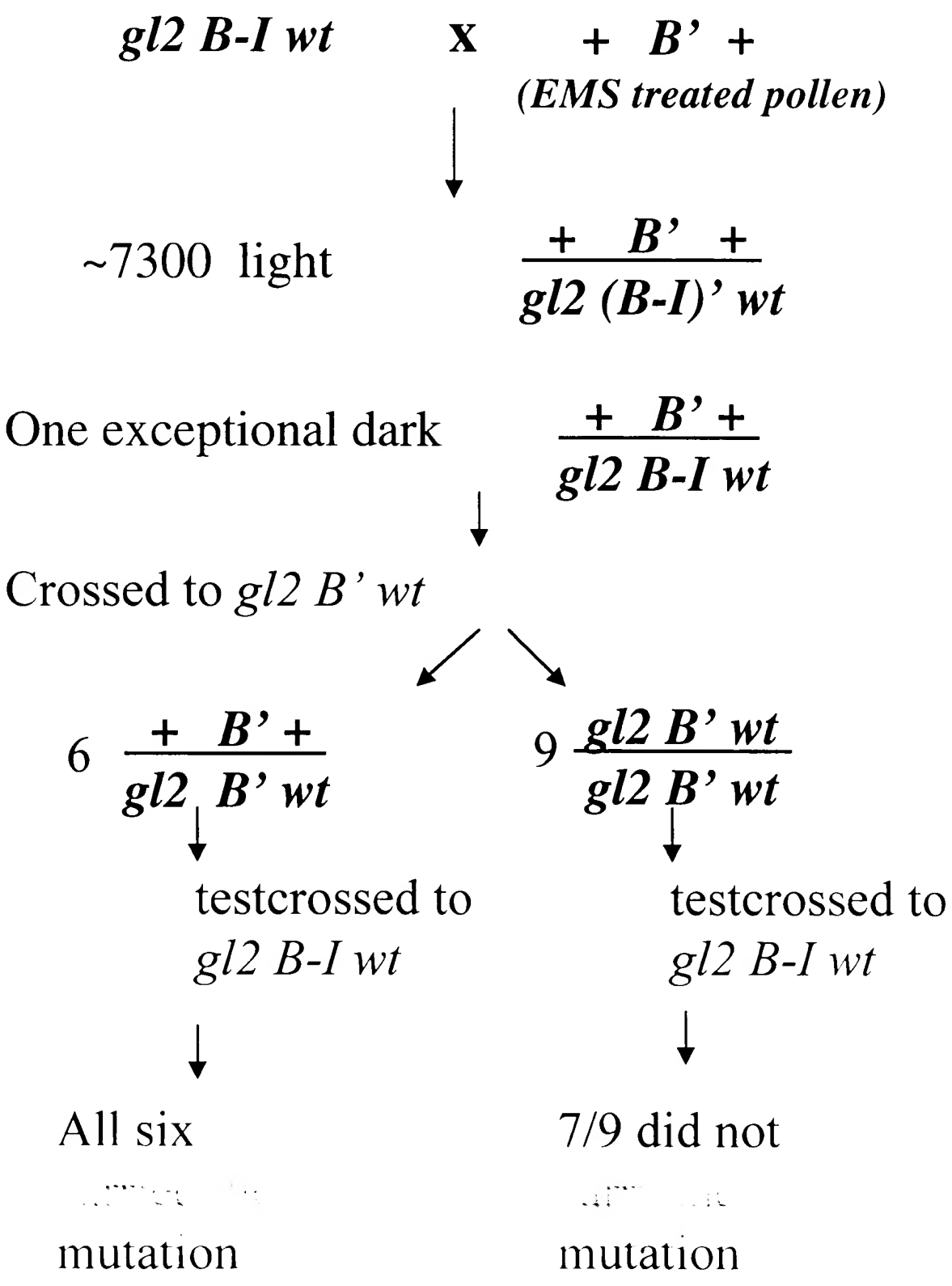

gl2 B-I wt
x
+ B' +
(EMS treated pollen)
~7300 light
+ B' +
gl2 (B-I)' wt
One exceptional dark
+ B' +
gl2 B-I wt
Crossed to gl2 B' wt
6
+ B' +
gl2 B' wt
9
gl2 B' wt
gl2 B' wt
testcrossed to
gl2 B-I wt
testcrossed to
gl2 B-I wt
All six
mutation
7/9 did not
mutation

Figure 23

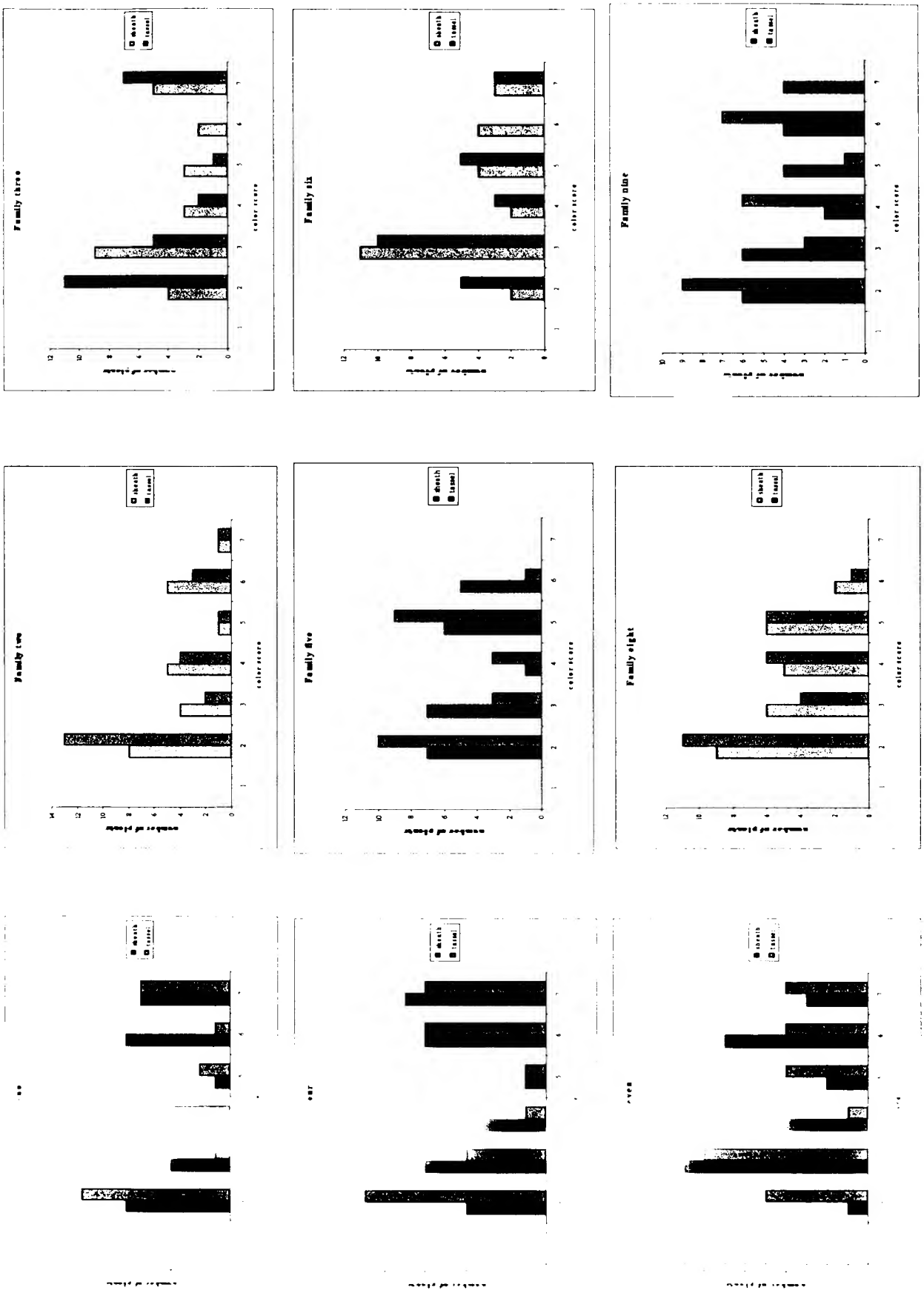

Family three
Family six
Family nine
Family two
Family five
Family eight
color score

Figure 24

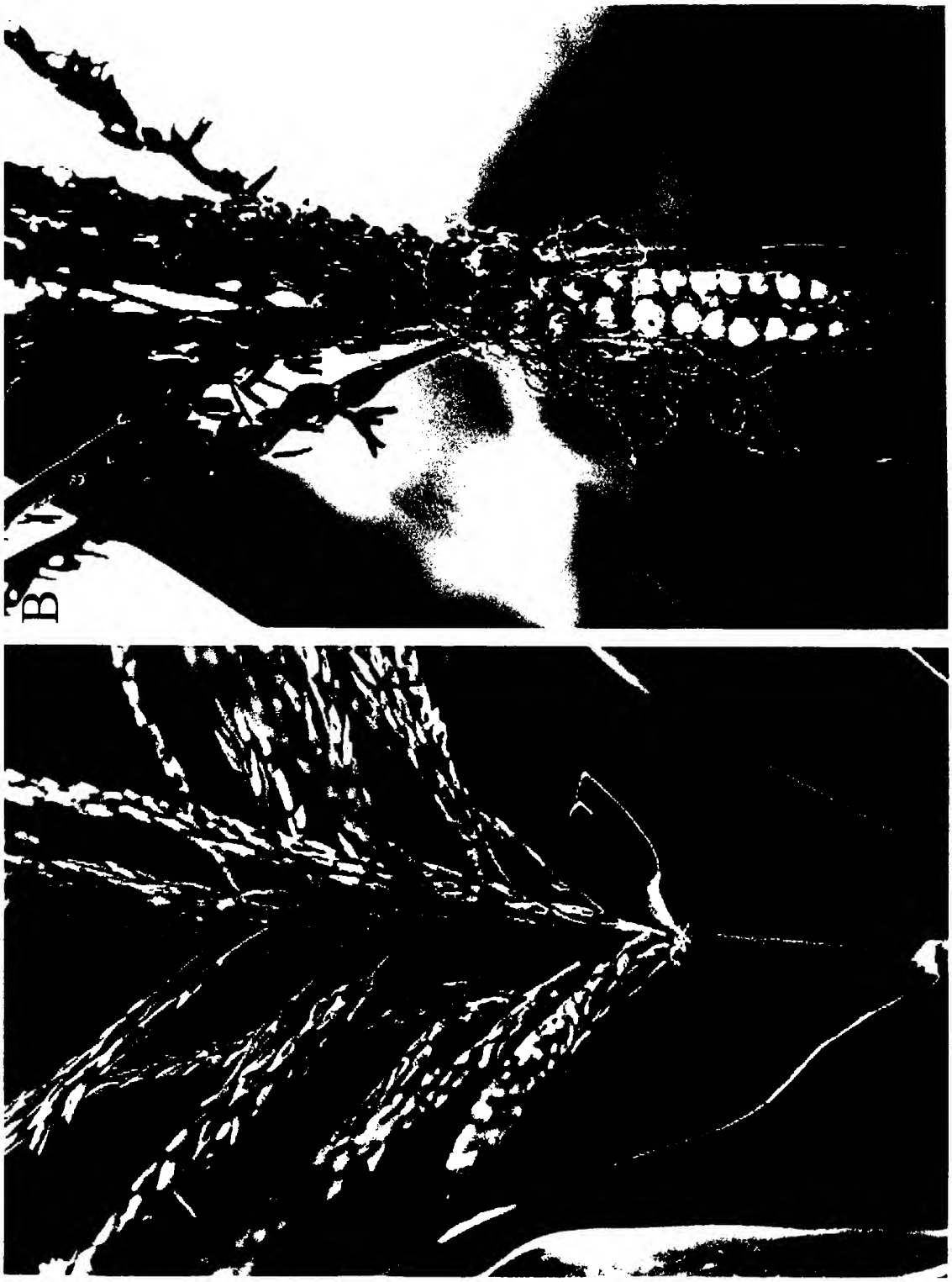


Figure 25

EtBr stained gel
b1 RNA
A
Mop2-1/+
Mop2-1/Mop2-1
Mop2-1/Mop2-1
B
mop3-1/mop3-1
mop3-1/+
mop1-1/mop1-1
mop1-1/+
C
CC2343 light
CC2343 light
CC2343 dark
CC2343 dark

Figure 26

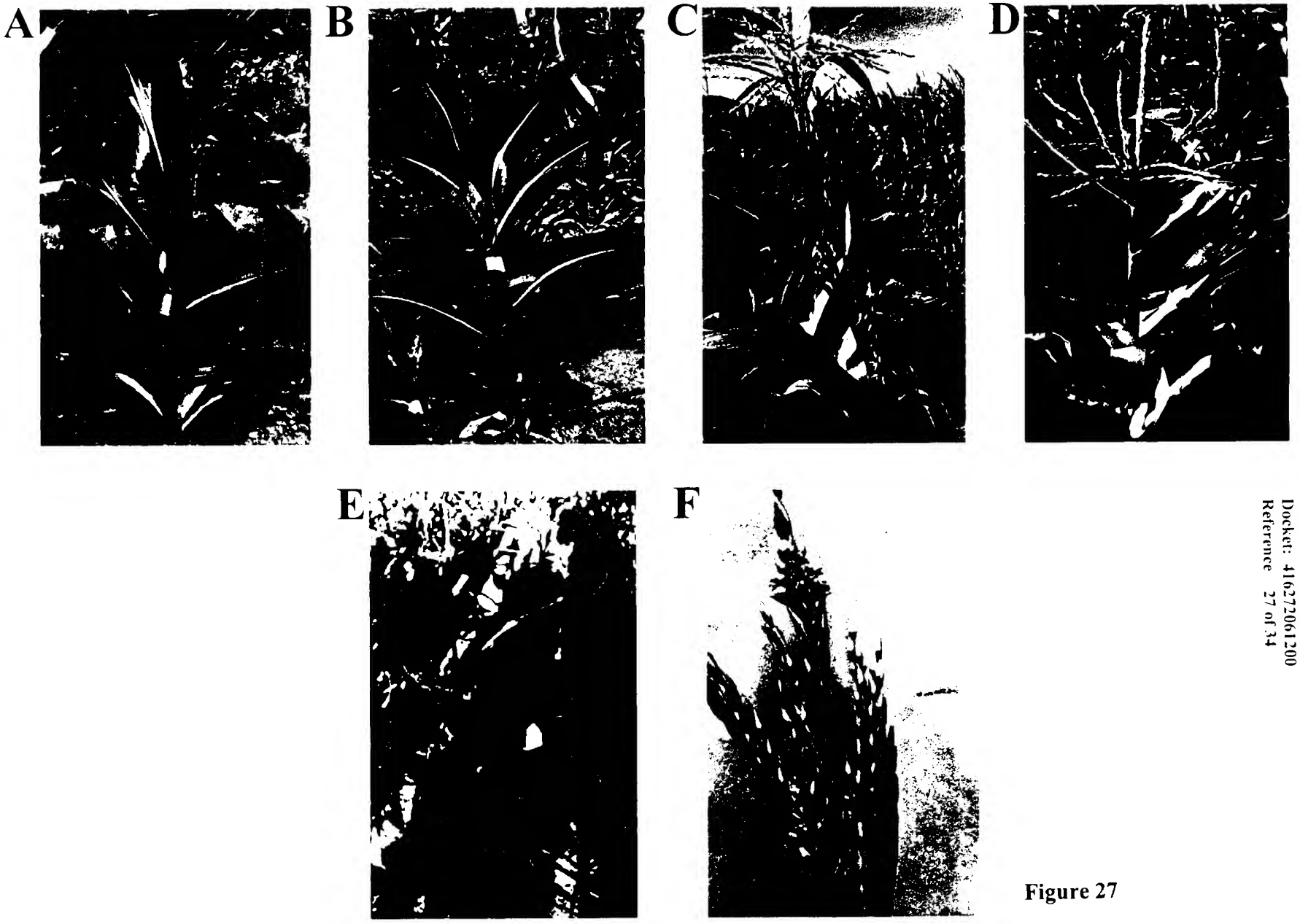


Figure 27

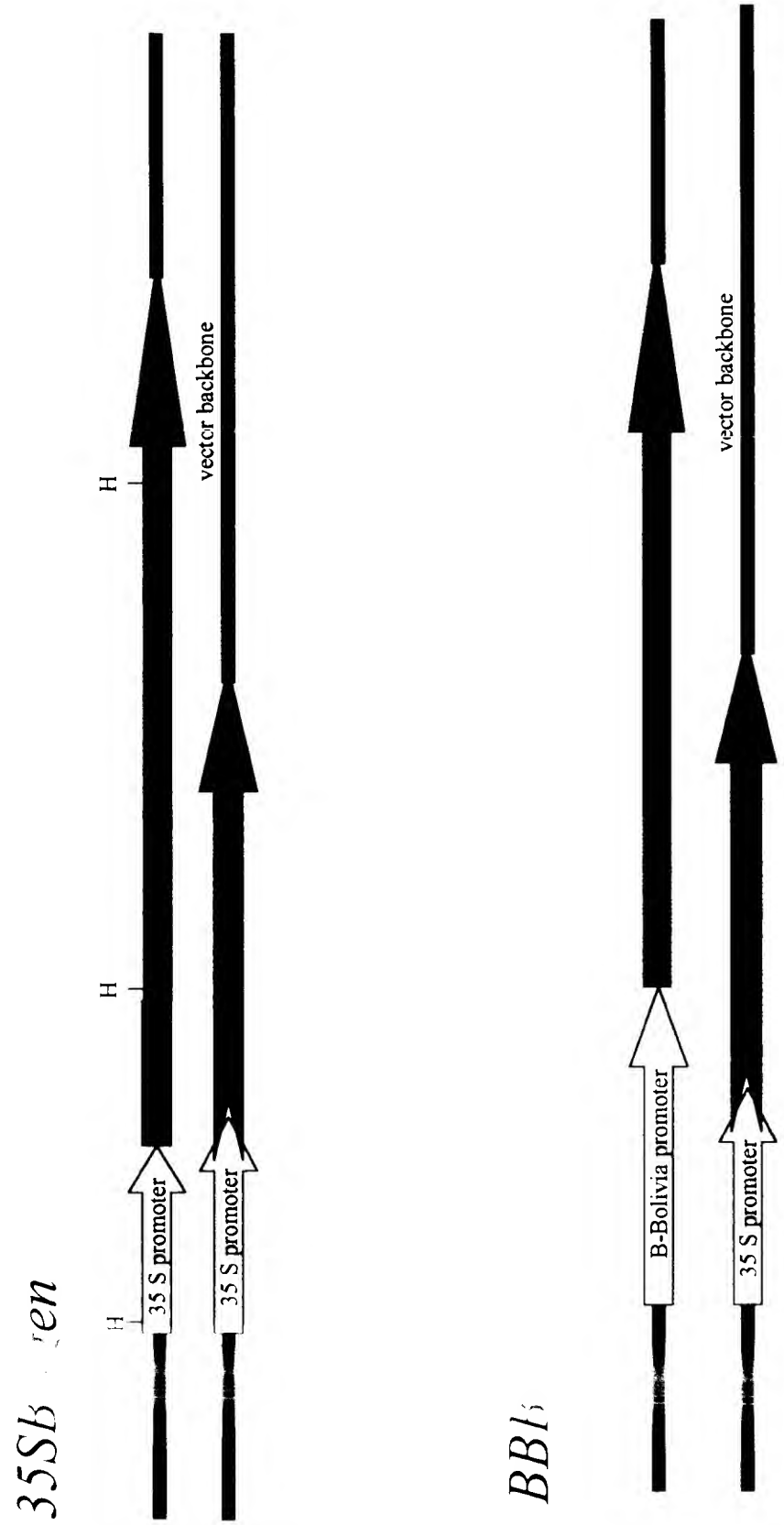

35Sb
H
35 S promoter
H
H
vector backbone
35 S promoter
BBb
B-Bolivia promoter
vector backbone
35 S promoter

Figure 28

A

B' Mop2-1 Mop2 B' Mop2-1/Mop2-1
35SB-I

B

rmr2-1/rmr2-1 Rmr2/rmr2-1
35SB-I

C

B' mop1-1/mop1-1 B' Mop1/mop1-1
35SB-I

D

rmr1-1 Rmr1/rmr1-1
35SB-I

E

Rmr2/rmr2-1 rmr2-1/rmr2-1

BBBS

Figure 29

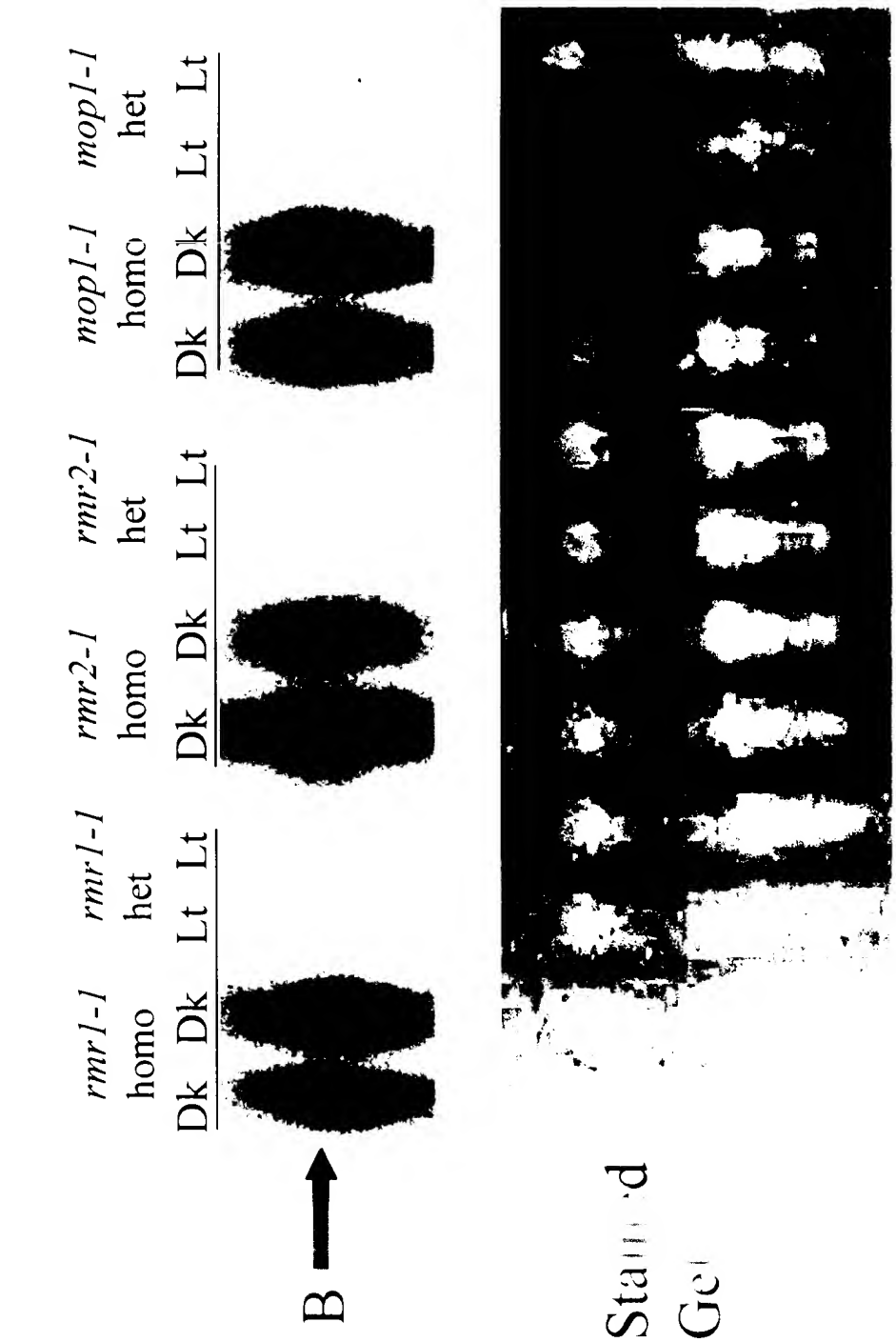

rmr1-1 homo
rmr1-1 het
rmr2-1 homo
rmr2-1 het
mop1-1 homo
mop1-1 het
Dk Dk Lt Lt
Dk Dk Lt Lt
Dk Dk Lt Lt
B
Stan d
Ge

Figure 30

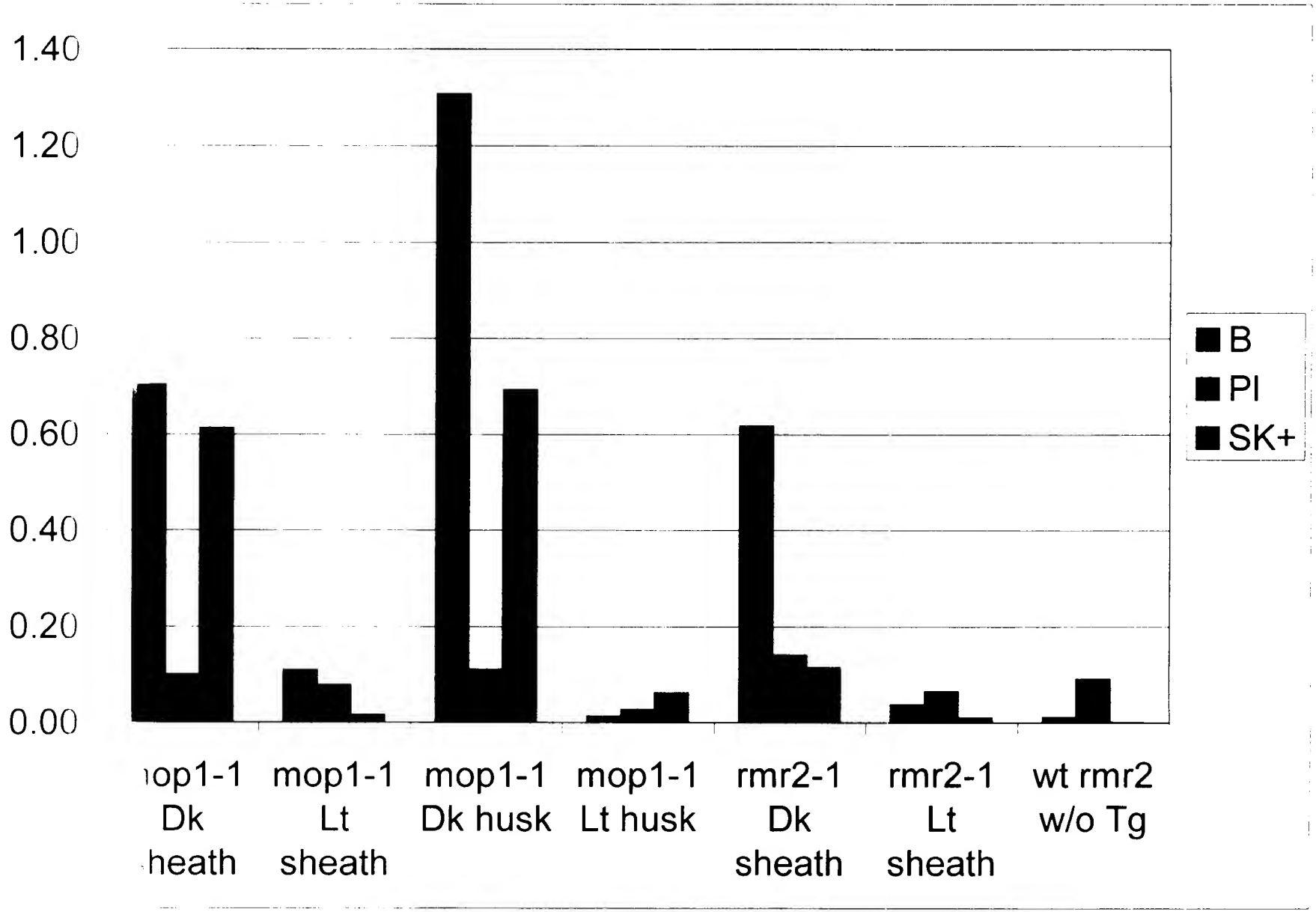

1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
B
PI
SK+
op1-1 Dk heath
mop1-1 Lt sheath
mop1-1 Dk husk
mop1-1 Lt husk
rmr2-1 Dk sheath
rmr2-1 Lt sheath
wt rmr2 w/o Tg

Figure 31

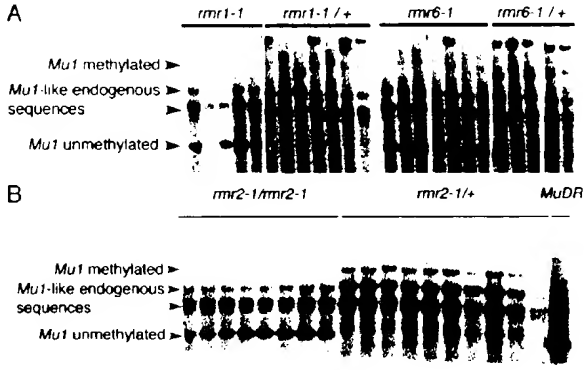

A
rmr1-1
rmr1-1 / +
rmr6-1
rmr6-1 / +
Mu1 methylated
Mu1-like endogenous sequences
Mu1 unmethylated
B
rmr2-1/rmr2-1
rmr2-1/+
MuDR
Mu1 methylated
Mu1-like endogenous sequences
Mu1 unmethylated

Figure 32

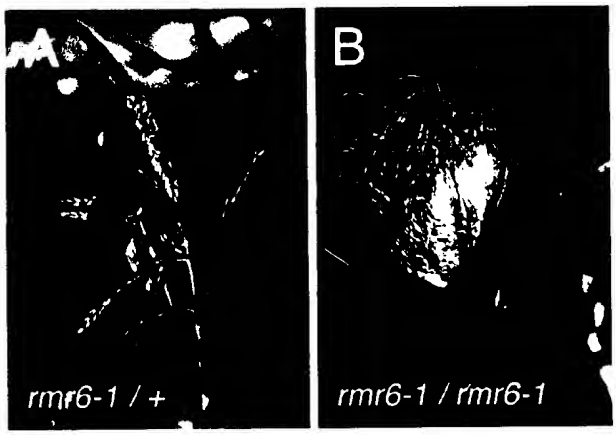


Figure 33

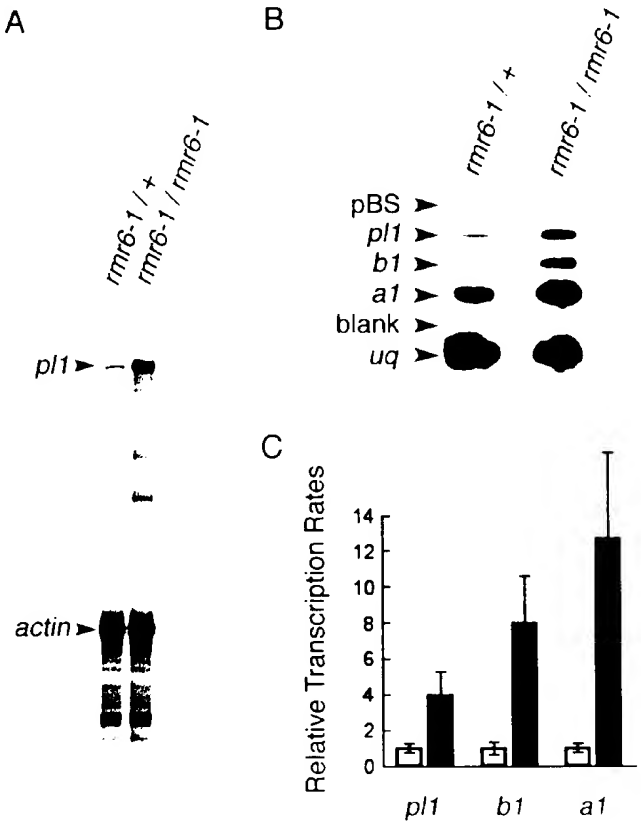

A
rmr6-1 / +
rmr6-1 / rmr6-1
pl1
actin
B
rmr6-1 / +
rmr6-1 / rmr6-1
pBS
pl1
b1
a1
blank
uq
C
Relative Transcription Rates
14
12
10
8
6
4
2
0
pl1
b1
a1

Figure 34